from a record of moderate length but that the coefficient of skewness cannot be computed with any degree of precision except from a very long record. However, he shows that for practical work an average coefficient of skew may be assumed as applicable to data of all the stations. This average coefficient was not determined in this study. Whatever it may be, with the same coefficient of skewness for all stations, the coefficient of variation can be used as a measure of variability.

Any locality with a low coefficient of variation will get more nearly the average amount of rainfall each year than will a locality with a higher coefficient. For instance from table 4 this coefficient is 0.358 or nearly 0.36 for Honolulu (station no. 1) and 0.46 for Ewa Plantation Mill (station no. 18). This means that a variation of 36 percent from the average at Honolulu comes as often as one of 46 percent from the average at Ewa Plantation Mill and with a frequency of once in about 6 or 7 years. In other words, the variations at different localities are directly proportional to the coefficient of variation at those localities.

In table 3 the percentage of years of 15 or a probable frequency of once in 6.7 years corresponds closely to a variation in annual rainfall equal to the coefficient of variation. More exactly it is 16 percent instead of 15 since as previously mentioned 34 percent of the total observations fall between the ordinates at x = average and at $x = \sigma$.

In figure 10 the lines of equal coefficients closely follow the lines of equal average annual rainfall (isohyets). Isohyetal lines are shown in the map of figure 1. It is evident that, in general, the wetter regions are regions of smaller variations. Three regions of low coefficients are distinguishable: (*a*) around the north central crest of the Koolau Range, (*b*) around the crest of the Waianae Mountains, and (*c*) the regions somewhat to leeward of the crest of the southern portion of the Koolau Range. The first region incloses the wettest area of Oahu Island, the average annual rainfall being 240 inches. In the third region coefficients are equally low although the average annual rainfall is about 140 inches. The region to the south and southwest of Pearl Harbor has the highest variability, and it is also the driest region of the island.

Like the maps of isohyetal lines the map of figure 10 should be regarded as an approximation in view of the character of the topography. Great differences in annual rainfall are noticeable over short distances; likewise, in the coefficients of variation, so that more complete data are likely to change the position of the lines of figure 10.

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PRELIMINARY STATEMENT OF TORNADOES IN THE UNITED STATES DURING 1933

By R. J. MARTIN

[Weather Bureau, Washington, D.C., January 1934]

In keeping with the custom of recent years, a preliminary statement of loss of life and property damage by windstorms is included in the December issue of the REVIEW. A final and more detailed study will be made during next summer, and will appear in the Report of the Chief of the Weather Bureau for the year 1933–34. Practically all of the information given in this summary is abstracted from the monthly REVIEW tables of "Severe Local Storms" which are compiled from the reports of many observers and the various section directors of the Bureau. While it is thought the figures given are substantially correct it must be remembered that all are subject to change after the final study mentioned above.

May, with 73 (possibly 80) tornadoes and 205 fatalities, was the month with the greatest number of storms and greatest loss of life. The second highest figures occurred in March, with 33 tornadoes and 95 deaths. Both these months were exceeded in property damage by April; during which month there were 26 storms and a property loss of nearly $10,000,000.

The total number of tornadoes during the year, 197, was considerably greater than in 1932. This figure has been exceeded only twice (1928 and 1929) during the last 18 years. The total number of deaths resulting from the 1933 storms was 343, which is considerably less than the 1932 number (394) and far less than the 1925 and 1927 figures (794 and 540, respectively).

The property damage caused by such storms in 1933 is roughly estimated at $22,180,000—nearly three times that of the preceding year. This total has been exceeded only three times during the last 18 years, in 1927 ($43,445,650), 1924 ($26,120,850), and 1925 ($24,023,900).

If further study shows the storms listed in the table of tornadic winds to be true tornadoes, the 1933 sums will be 220 tornadoes (greater than either the 1928 or 1929 figure), 344 deaths, and property losses exceeding $23,908,000.

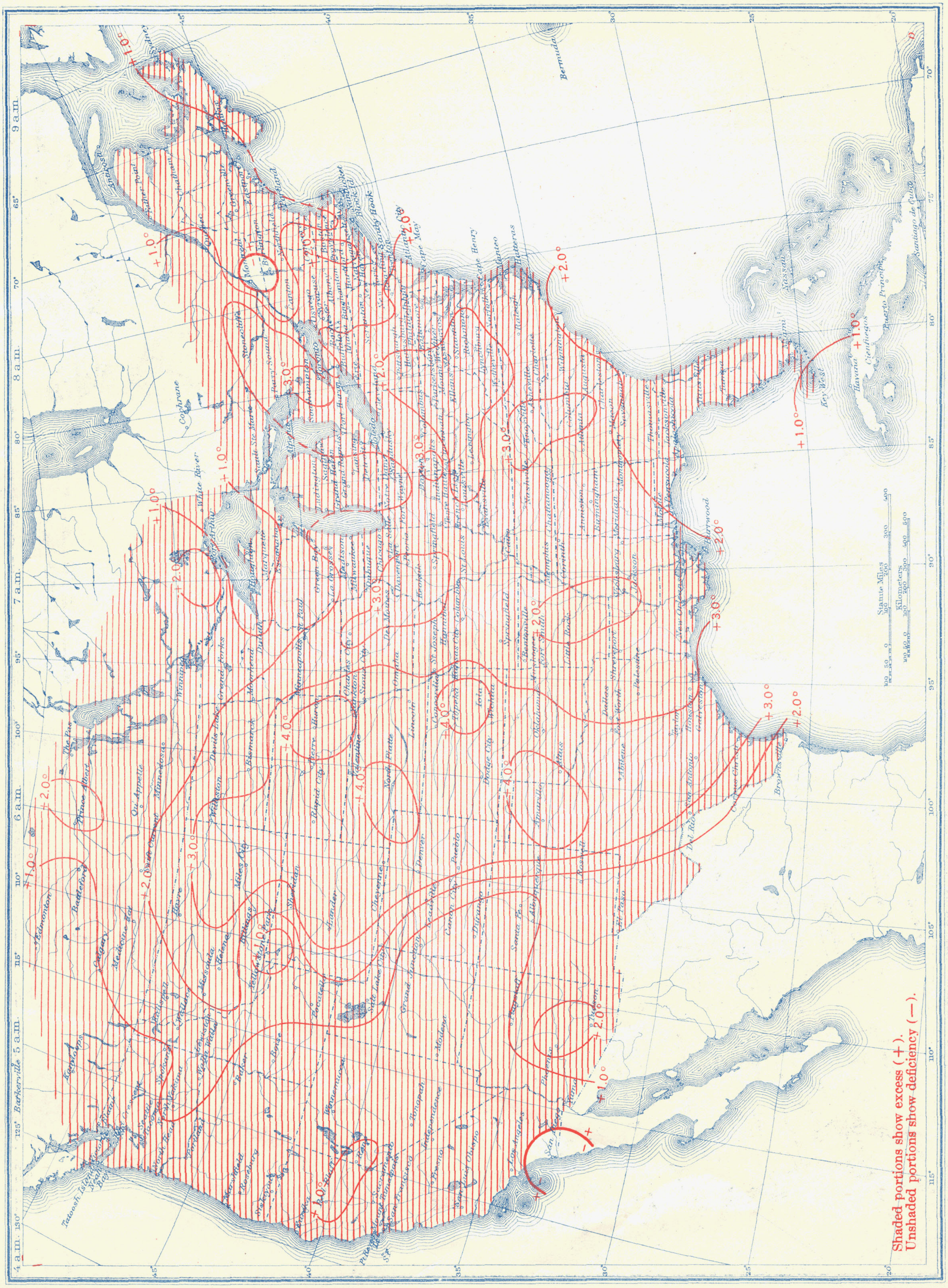
TORNADOES AND PROBABLE TORNADOES

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Number	10	4	33	26	73	14	11	10	5	5	1	5	197
Deaths	4	0	95	20	205	2	7	1	0	3	0	6	343
Damage [1]	1,136	37	3,362	9,645	7,046	181	613	110	6	8	2	[2] 34	22,180

TORNADIC WINDS AND POSSIBLE TORNADOES [3]

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Number	0	0	1	1	7	5	7	1	1	0	0	0	23
Deaths	------	----	0	0	0	1	0	0	0	----	----	----	1
Damage [1]	------	----	1	1	1,215	365	[2] 106	40	[4] 0	----	----	----	1,728

[1] In thousands of dollars.
[2] Damage occurred in addition to amount stated.
[3] Some of these may not be classed as tornadoes in the final study.
[4] Damage occurred; no estimate secured.



I. Annual Temperature Departures (°F.) in the United States, 1933
(Plotted by R. J. Martin)

II. Annual Precipitation Departures (inches) in the United States, 1933
(Plotted by R. J. Martin)